CLAIMS

1. A microfluidic device comprising one, two or more microchannel structures **(101a-h)**, each of which comprises a reaction microcavity **(104a-h)** intended for retaining a solid phase material in the form of a wet porous bed, **characterized** in that each of said one, two or more microchannel structures **(101a-h)** comprises the solid phase material in a dry state that comprises a bed-preserving agent comprising one or more compounds having bed-preserving activity.

2. The microfluidic device according of claims 1, **characterized** in that at least one of said one or more compounds a) exhibit a hydrophilic group that may or may not be non-ionic, and b) are water-soluble.

3. The microfluidic device according to any of claims 1-2, **characterized** in that at least one of said one or more compounds is a polyol.

4. The microfluidic device according to any of claims 1-3, **characterized** in that at least one of said one or more compounds exhibits carbohydrate structure, such as polysaccharide structure or oligosaccharide structure.

5. The microfluidic device according to any of claims 1-4, **characterized** in that at least one of said one or more compounds is a disaccharide, preferably trehalose.

6. The microfluidic device of any of claims 1-5, **characterized** in that at least one of said compounds is a microcavity adherence agent.

7. The microfluidic device according to any of claims 1-6, **characterized** in that said dry state comprises a non-volatile buffer, e.g. a phosphate buffer possibly with potassium ion as a counter-ion.

8. The microfluidic device according to 1-7, **characterized** in that said dry state has been accomplished within the microfluidic device.

9. The microfluidic device according to any of claims 1-8, **characterized** in that said dry state has been obtained under subatmospheric pressure from the porous bed saturated with an aqueous liquid, for instance above or below the freezing point of the liquid, or by drying the porous bed saturated with water in ambient atmosphere with or without warming.

10. The microfluidic device according to any of claims 1-9, **characterized** in that
    a) said solid phase material is in the form of porous or non-porous particles, and
    b) the porous bed is a packed bed of these particles.

11. The microfluidic device according to any of claims 1-10, **characterized** in that said solid phase material is swellable or not swellable.

12. The microfluidic device according to any of claims 1-11, **characterized** in that each of said one, two or more microchannel structures **(101a-h)** comprises an inlet arrangement **(102,103a-h)** with a volume-metering unit **(106a-h,108a-h)** connected to the reaction microcavity **(104a-h)**.

13. The microfluidic device according to any of claims 1-12, **characterized** in that the device comprises two or more microchannel structures **(101a-h)** that are divided into one, two or more groups **(100)** of microchannel structures, each group comprising an inlet arrangement **(102)** which
    a) is common to all the microchannel structures of the group **(100)**, and
    b) comprises
        (i) a common inlet port **(105a-b)**, and
        (ii) for each microchannel structure **(101a-h)** of the group, a volume-metering unit **(106a-h)** that in the upstream direction is connected to the common inlet **(105a-b)** port and in the downstream direction to the reaction microcavity **(104a-h)** of the microchannel structure **(101a-h)**.

14. The microfluidic device according to any of claims 12-13, **characterized** in that the inner wall of each of said volume-metering units **(106a-h,108a-h)** have a sufficient hydrophilicity for being filled by capillarity once an aqueous liquid have

entered the unit, and b) a valve (**109a-h,110a-h**) at its outlet, for instance a passive valve.

15. The microfluidic device according to any of claims 1-14, **characterized** in that each microchannel structure (**101**) is designed for driving a liquid flow through at least a portion of the structure by centrifugal force.

16. The microfluidic device according to any of claims 1-15, **characterized** in that the solid phase material comprises an immobilized reactant, typically an immobilized affinity reactant AC_S for affinity capturing a solute S.

17. The microfluidic device according to claim 16, **characterized** in that the immobilized reactant is an immobilized ligand L which is a member of an immobilizing affinity pair comprising L and the affinity counterpart B to L and which is intended for the immobilization of a conjugate B-AC_S to the porous bed where AC_S is an affinity counterpart to a solute S.

18. The microfluidic device according to claim ,17 **characterized** in that the affinity constant ($K_{S\text{--}AC}$) for formation of the complex (S--AC) between the solute (S) and the affinity counterpart (AC_S) to the solute, i.e. ($K_{S\text{--}AC}$) = [S][AC_S]/[S--AC_S], is at most 10^{-6} mole/l.

19. The microfluidic device according to claim 18, **characterized** in that the affinity constant of the immobilizing affinity pair, i.e. $K_{L'\text{-}B}$ = [L'][B']/[L'--B'], is at most 10^3 times larger than the corresponding affinity constant for streptavidin and biotin,
with preference for the affinity pair L' and B' being selected from biotin-binding compounds and streptavidin-binding compounds, respectively, or vice versa.

20. The microfluidic device according to claim 19, **characterized** in that B has one or more binding sites for L, and L has two or more binding sites for B, or vice versa.

21. The microfluidic device according to any of claims 16-20, **characterized** in that at least one of S and AC_S and/or at least one of L, B, AC_S and S comprise a structure selected amongst peptide structure including poly/oligo-peptide and protein structure, carbohydrate structure, nucleotide structure including nucleic acid structure, and lipid structure.